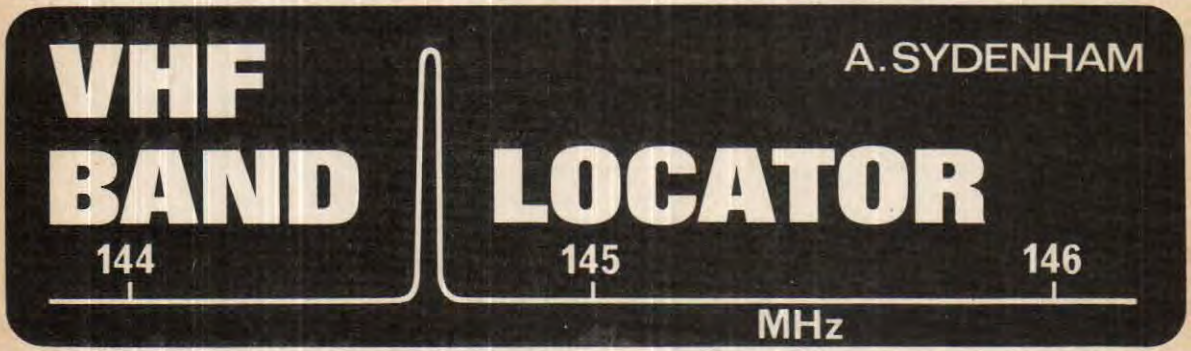
VHF BAND LOCATOR

A. SYDENHAM



THE easily built unit to be described is used to provide a signal in the 2 metre Amateur band (144-146MHz). When constructing or modifying apparatus for 2 metre use it can be very difficult indeed to locate the band or any part of it. Indeed in some areas, amateur activity is so low that many hours of experimenting may be wasted in tuning for non-existent transmissions. Experienced constructors will know to their cost that at v.h.f. finicky adjustments are often required and in the case of a tuning coil for example just one half turn too little or too much may result in the circuit being so far off frequency as to be useless for the purpose required. To overcome problems such as these this unit was quickly assembled—and at small cost.

The circuit of the device is shown in Fig. 1; it is by no means unique but rather the practical outcome of some earlier experiments. Basically a crystal-controlled oscillator—Tr1 and associated items—provide harmonic output which is lightly audio modulated due to Tr2 circuitry. The modulating section is by no means essential but it does enable the user to aurally recognise the v.h.f. signal being generated which is, in the case of the 6025kHz crystal utilized, the twenty-fourth harmonic (6025 x 24 = 144·6MHz). Whether or not the final generated frequency is exactly at this figure is not too important provided it is in the 2 metre amateur band.

Inductor L1 is tuned by trimmer TC1 to the crystal harmonic frequency, L2 merely being a low impedance untuned output link closely coupled to L1. In the f.e.t. source circuit inductor L3 is tuned to the crystal frequency by capacitor C1, final fine tuning being accomplished by means of the dust core which when once set can be so left. The drain current taken by Tr1 when oscillating correctly is approximately 2mA from a 9V d.c. supply.

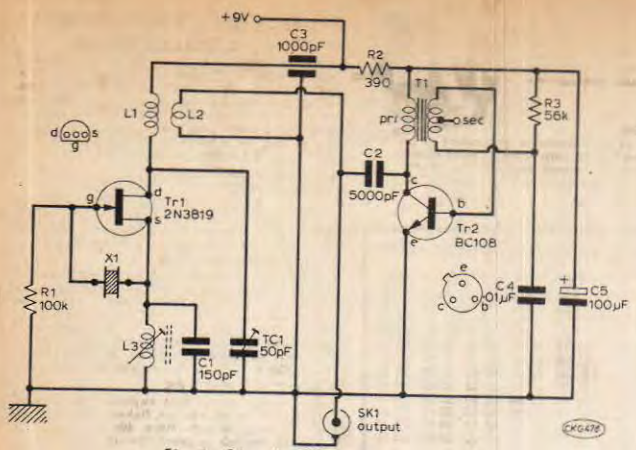


Fig. 1: Circuit of the complete unit.

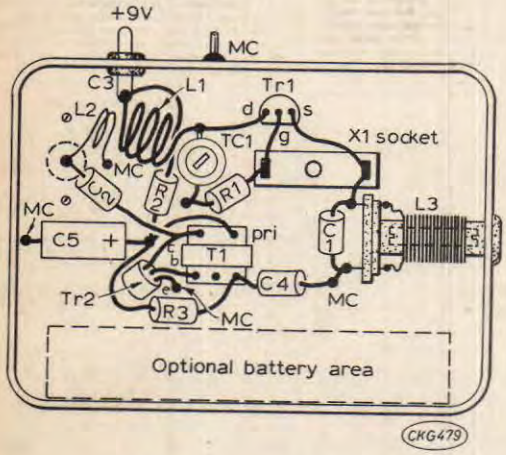


Fig. 2: Component layout and wiring.

The circuitry around Tr2 enables audio oscillations to be generated, transformer T1 providing the required collector-base feedback. The transformer used is a sub-miniature type driver transformer removed from a defunct broadcast band receiver. Such items are not difficult to come by and in any case the type is not critical provided the primary and secondary windings have measured resistance values approximating to 500 and 150 ohms respectively. If difficulty exists in finding a suitable surplus transformer for T1 a readily available item is the Ardente type T1079 interstage model. In some cases—and particularly if the Ardente transformer is used—it may be necessary to increase the value of resistor R3 to say 100kΩ. The frequency due to the audio generator is of little consequence provided it is recognizable.

Constructional

Since it is essential to screen the apparatus the ubiquitous 2-oz tobacco tin provides a cheap and convenient housing which also leaves sufficient internal space for a small battery if desired. The location of components is shown in Fig. 2 which is self-explanatory. As will be appreciated only the crystal, output socket and supply connectors exist outside when the tin lid is placed in position. In the prototype the negative supply lead is soldered direct to the case, the nearby positive supply being taken inside via a small feed-through capacitor.

The inductors are home-made, L1 consisting of 3 turns of 24 s.w.g. copper wire wound on to a $^3/_8$in. diameter 'former" and allowed to spring off; L2 is similarly made using but $1^1/_2$ turns. Both windings are spaced wire thickness. Some 24 turns of fine d.s.c. wire (30-38 s.w.g.) are close-wound on to a $^1/_4$in. dust-cored former to make L3.

★ components list

Resistors

R1	100kΩ
R2	390Ω
R3	56kΩ

Capacitors

C1	150pF
C2	5000pF
C3	1000pF feed-through
C4	0·01μF
C5	100μF 10V electrolytic
CT1	50pF miniature trimmer

Miscellaneous

Coil former, ¼in. diameter with dust core, 2-oz. tobacco tin, 9V battery, wire, solder, etc. X1, quartz crystal 6025kHz with holder to suit—see text. T1—see text.

Transistors

Tr1	2N3819
Tr2	BC108

Testing

With one end of R2 temporarily disconnected and a crystal plugged in, a meter set to read 0-10mA placed in series with a 9V battery supply may initially read full scale or thereabouts, this indicating, as is likely, a non-oscillating condition. The core of L3 is then carefully adjusted until the current being monitored falls suddenly to around 2mA, this indicating correct functioning.

With R2 reconnected the current reading obviously increases whereupon the secondary winding of T1 is briefly short-circuited with a metal blade whilst carefully noting the test meter pointer. If no current change is detected as the short-circuit is made and broken the audio oscillator is not working and it will be necessary to reverse the connections to either the primary or the secondary windings of T1—but not both—to phase the feed-back correctly.

If a short rod aerial is then plugged into the output socket, SK1, and is brought close to a 2-metre receiver—or as is more likely a 2-metre converter working with a receiver—a signal due to the unit should be tunable whereupon trimmer TC1 may be peaked for maximum output.

Thereafter crystals in the frequency range of 6005-6083kHz may be used to give harmonic output between 144-146MHz. Alternatively crystals in the frequency range of 8005-8111kHz may be utilized provided inductor L3 is retuned to this region thus affording eighteenth harmonic output. ■